

Static stiffness and stress distribution of gasoline and natural gas vehicle platforms subjected to torsion loads

ABSTRACT

In this paper, a Natural Gas Vehicle (NGV) body was developed from the gasoline base platform by modifying the liquid fuel tank compartment to suit three cylindrical natural gas tanks. Analyses were carried out to determine the stiffness and stress distribution of the NGV body. This is to ensure that structural rigidity and strength of the NGV body is comparable to that of the gasoline base body. Finite element method was used. The load is applied at the right front suspension of the vehicle. The value of the load is varied from 0.0N up to 5000.0N with the increment of 500.0N. The study showed that the gasoline and natural gas vehicle platforms have the torsion stiffness in x value of 489.96 Nm/degree and 468.12 Nm/deg respectively, torsion stiffness in y of 2822.2 Nm/degree and 2696.4 Nm/deg respectively. The maximum stress value for the gasoline vehicle platform under 5000.0 N loads is 1.65 N/m² while for the natural gas vehicle platform; the maximum stress value is 3.11 N/m². The results show that the rear platform for natural gas is acceptable.

Keyword: Finite element analysis; Natural gas vehicle body; Static torsion stiffness